REMARKS

Initially, applicants would like to thank Examiner Luu for granting an interview and for his time spent in the interview.

Claims 1-3, 7-19, 21, 24-33 and 57-64 were previously pending in the application. New claims 65 and 66 are added. Therefore, claims 1-3, 7-19, 21, 24-33 and 57-66 are presented for consideration.

Claims 1-3, 11, 13, 16, 18-19, 27, 29, 32 and 57-64 are rejected as anticipated by AVANZINO et al. 6,350,687. This rejection is respectfully traversed.

As set forth at the interview, applicants' position is that AVANZINO et al. do not disclose or suggest removing CuOX. In contrast, AVANZINO et al. teach a passivation step wherein the CuOx remains on the surface of the semiconductor substrate. Column 5, line 35 of AVANZINO et al. discloses that the passivating film remains on the CU surface.

The position stated in the Official Action is that AVANZINO et al. disclose a step of removing CuOx from a surface and simultaneously or subsequently carrying out an anti-corrosion treatment. Column 6, lines 33-56 of AVANZINO et al. are offered in support of this position. The Official Action also offers column 7, lines 1-5 of AVANZINO et al. for teaching a process of removing a thin native copper oxide. The Official Action has

equated the removal of the thin native copper oxide as a teaching of removing CuOx.

However, as pointed out at the interview, the position stated in the Official Action is not supported by the reference. Specifically, as pointed out at the interview, the cleaning step of AVANZINO et al. would not remove copper oxide from the surface of the semiconductor substrate, but instead forms a passivating film over the surface.

As disclosed on page 30, lines 2-6 of the present application, a scrub cleaning process is carried out for removing particle contaminations from the planarized surface of the semiconductor wafer 1. To implement this cleaning process, a cleaning solution is applied to a rotating brush for removing particle contaminations from the planarized surface of the semiconductor wafer 1.

Page 30, lines 6-15 of the present application further disclose that subsequently (to the removal of the particle contaminations) a spin cleaning process is carried out for removing the metal contaminations from the above planarized surface of the semiconductor wafer 1 by using, for example, a carboxylic based cleaning solution, such as an oxalic acid solution. The semiconductor wafer is rotated while a supply of cleaning solution having 0.03% oxalic acid is applied for 10

seconds for removing CuOx from the above planarized surface of the semiconductor wafer 1.

Accordingly, the cleaning process of the present application is a two-step cleaning process wherein the first step removes particle contaminations from a semiconductor surface using a rotating brush and the second step comprises removing the previously formed particle contaminations using a cleaning solution such as an oxalic acid solution. The second part of the cleaning process removes CuOx from the planarized surface of the semiconductor wafer 1.

In contrast, as further discussed at the interview, the cleaning process of AVANZINO et al. as disclosed at column 6, lines 33-56, specifically lines 45-48, disclose a cleaning step to remove contaminations such as abrasives, electrolytes and copper compounds from the surfaces of the wafer, for example, by double sided brush scrubbing.

Accordingly, the cleaning process of AVANZINO et al. is a single-step cleaning process that uses a double sided brush scrubbing to remove particle contaminations similar to the first step of the present application. AVANZINO et al. is silent as to the removal of metal contaminations (CuOx) from the surface of the wafer formed by the brush scrubbing step. The step of removing CuOx from the surface of the wafer is a deliberate step separate from removing particle contaminations from the wafer and

is not an advantage recognized by applicants that would be inherent to the cleaning process of AVANZINO et al.

Accordingly, AVANZINO et al. neither disclose removing CuOx explicitly nor is such process inherent to the cleaning process of AVANZINO et al. In addition, the assertion in the Official Action that column 7, lines 1-5 of AVANZINO et al. discloses removing a thin native copper oxide is not supported by the reference. Specifically, this passage discloses in part "allowing the compound to coat and react with the thin native copper oxide on the metal surface." (emphasis added).

Such coating and reacting implies that the compound remains on the metal surface and in fact as set forth above, column 5, line 35 of AVANZINO et al. does teach that the coating remains on the surface. The passages of AVANZINO et al. do not disclose that the thin native copper oxide is removed only that there is a reaction with the passivating compound and/or that the passivating compound coats the thin native copper oxide.

Accordingly, as agreed at the interview, this passage appears to disclose that the thin native copper oxide remains on the metal surface and reacts with and is coated by the passivating compound. AVANZINO et al. do not disclose or suggest removing CuOx from the surface of the semiconductor substrate.

As the reference does not disclose that which is recited, the anticipation rejection is not viable.

Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 2, 3, 11, 13, 16 and 57-59 depend from claim 1 and further define the invention and are also believed patentable over AVANZINO et al.

Claim 18 provides a step of subsequently removing CuOx from a surface of a semiconductor substrate using a cleaning solution. The comments regarding claim 1 above are equally applicable to claim 18. Claims 19, 27, 29, 32 and 60-62 depend from claim 18 and further define the invention and are also believed patentable over the cited prior art.

Claim 63 provides a step of removing CuOx from a surface. The comments above regarding claim 1 are equally applicable to claim 63. Claim 64 depends from claim 63 and further defines the invention and is also believed patentable over AVANZINO et al.

Claims 8-10, 14, 24-26 and 30 are rejected as unpatentable over AVANZINO et al. in view of LAWSON 4,978,756. This rejection is respectfully traversed.

LAWSON is only cited for the teaching of anti-corrosive agents that comprise hetero-cyclic compounds and derivatives thereof. LAWSON does not disclose or suggest removing CuOx from a surface of a semiconductor substrate as recited in each of independent claims 1 and 18. As set forth above, AVANZINO et al.

do not disclose or suggest what is recited in claims 1 and 18. Since claims 8-10, 14, 24-26 and 30 depend from claims 1 and 18, respectively, and further define the invention, the combination of references would not render obvious claims 8-10, 14, 24-26 and 30.

Claims 7 and 21 are rejected as unpatentable over AVANZINO et al. in view of applicants' disclosed prior art. This rejection is respectfully traversed.

As set forth above, the cleaning process of AVANZINO et al. leaves a thin native copper oxide on the metal surface such that the passivating compound can coat and react with the thin native copper oxide. Applicants' disclosed prior art teaches a cleaning step that includes applying a cleaning solution that comprises a carboxylic acid.

The proposed combination of references would not teach one of ordinary skill in the art to remove the thin native copper oxide from the metal surface and simultaneously or subsequently carrying out an anti-corrosion treatment by exposing said surface of said semiconductor substrate to a solution containing an anti-corrosive agent. Therefore, the proposed combination of references is insufficient to render claims 7 and 21 *prima facie* obvious.

Claims 12, 15, 17, 28, 31 and 33 are rejected as unpatentable over AVANZINO et al. This rejection is respectfully traversed.

Claims 12, 15, 17, 28, 31 and 33 depend from one of claims 1 and 18, respectively, and further define the invention. As set forth above, AVANZINO et al. do not disclose or suggest what is recited in claims 1 and 18. Accordingly, based on the teachings of AVANZINO et al., one of ordinary skill in the art would not find it obvious to choose an SiON film or use the materials in the specific cited ranges. Therefore, claims 12, 15, 17, 28, 31 and 33 are also believed patentable over AVANZINO et al.

New claims 65 and 66 depend from claim 1 and provide further support as to why a two-step cleaning process of the present application is different than the cleaning process of AVANZINO et al. Support for the new claims may be found on page 30, lines 1-17, for example.

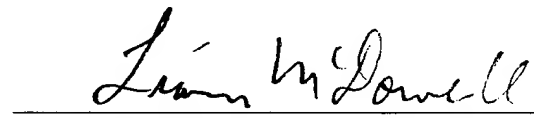
In view of the present amendment and the foregoing remarks, it is believed that the present application has been placed in condition for allowance. Reconsideration and allowance are respectfully requested.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON



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